

REMARKS

Claims 1, 3, 4, 9-12, and 14-20 stand rejected under 35 U.S.C. § 112, first paragraph, for lack of enablement regarding the limitation in claim 1 of mixing an acidifying agent with pieces of meat and holding the pieces of meat against each other. Claim 1 has been amended to clarify that the mixing step is distinct from the holding step as was originally set forth in claim 1 filed with the application. Withdrawal of the enablement rejection is respectfully requested.

Claims 1, 3, 4, 12, 14, 15, and 18-20 stand rejected under 35 U.S.C. § 102(b) for anticipation by each of U.S. Patent No. 4,772,477 to Weiss et al. and Rombauer et al., an excerpt from The Joy of Cooking, pages 812-813.

Claims 1, 3, 4, 9-12, and 14-20 stand rejected under 35 U.S.C. § 103(a) for obviousness over U.S. Patent No. 3,740,235 to Weiner in view of an abstract of German Patent No. 1,692,110 to Bauer et al. Claims 1, 3, 4, 9-12, and 14-20 stand rejected under 35 U.S.C. § 103(a) for obviousness over the Weiss et al. patent in view of the Weiner patent.

Applicant respectfully traverses these rejections for the following reasons.

The present invention is directed to a method for producing a coherent piece of raw meat from smaller pieces of raw meat. The present invention utilizes an acid coagulation process to perform controlled denaturation and coagulation of proteins on the interfaces of the pieces of meat. This acid coagulation process is controlled and selective, namely, it is discriminative in the location of its activity. The coagulation is localized to the interface between the pieces of meats and is discriminative in that the solubilized proteins react differently from unsolubilized proteins. Coagulation only occurs at the interfaces between the pieces of meat, hence, the bulk of the meat remains raw.

Coagulation does not readily occur without extreme process conditions. For example, an egg must be boiled at 100°C and a ham must be cooked for at least 4 hours at

temperatures above 700°C to achieve coagulation of the proteins therein. In boiled eggs or cooked ham, the proteins are coagulated in an irreversible process. The proteins of such coagulated products can no longer be solubilized. These heating methods are only one way of achieving coagulation; there are other ways of achieving coagulation such as via a chemical process including the use of acid. Acid coagulation is used in the production of cheese to precipitate milk proteins via denaturing and coagulation. Denaturization and coagulation are not instantaneous events. As the proteins undergoing treatment unfold, hydrogen bridges are ruptured and covalent bonds are formed. As the proteins are further denatured, sulfur bridges are formed. Although a product may appear coagulated after a period of time, the process can be continued to break the sulfur bridges to produce H₂S. A coagulation process is a continuum with many stages; the stage reached depends upon the time and the intensity at which proteins are treated. Animal proteins start denaturing at temperatures above 38°C, where it occurs quite slowly, but it may speed up with more extreme conditions, i.e., at higher temperatures.

Acid coagulation works in a similar manner. The denaturing process depends upon the time, pH, quantity of acid, temperature, buffering capacity of the proteins, and the state at which the protein is present. A protein which is embedded in a structure will react differently from a protein which is free in which the hydrogen bonds have been partially ruptured and which have been solubilized. Proteins solubilized via salt treatment have a double layer of electrolytes which are compressed, disrupted, or dissolved. Solubilized proteins are more exposed and, thus, have a lower barrier to coagulation.

The present invention takes advantage of the use of solubilized proteins, those which are not embedded in a structure to achieve acid coagulation.

The acid coagulation process of the present invention achieves controlled denaturation on the interface of the pieces of meat in such a way that the pieces are

essentially glued together and considered to be one piece. This "glue" is coagulated meat (not boiled meat). It is only a partial coagulation--in the continuum of protein coagulation, the proteins treated in the present invention are reacted to form some covalent bonds (coagulation) but the meat is still considered to be raw. The "glue" of the coagulation is strong enough to hold the pieces together but the process has not continued to the extent necessary to result in cooked meat. The coagulation can be considered to be a type of gluing in which the pieces of meat are glued together using natural meat proteins and coagulation to set the glue. As with gluing two pieces of wood together, one of the functions of the glue herein is to maximize surface contact. The mass of exuded proteins fulfills this function in the present invention. Thus, solubilization of the proteins is a crucial step in the process.

Next, to ensure that a glue attaches firmly to the surface, the surface often needs to be primed. Just as a surface of a plastic is primed by adding a solvent to the glue, in the present invention the surface of the meat is primed by activating the proteins on the surface of the meat. By treating the meat with the salt, a portion of the proteins on the surface will react partially to becoming activated without becoming fully solubilized and without leaving the structure in which they are embedded. Next, the meat masses must be immobilized and pressed together. Coagulation should start only after immobilization occurs. Thus, the release of the acid must be delayed until after the meat is immobilized. Any acid added before that time will reduce the efficiency of the glue. The acid glue of the present invention can be compared with the harder in a two component glue. The coagulation process results in very strong and tough bonding at the molecular level so that the pieces of meat cannot be readily separated. These features of the present invention are not achieved by the prior art of record taken alone or in combination.

The Weiss et al. patent describes how an acidification agent with delayed action can be used to make a limit range of meat products such as raw sausages, meatloaves,

and emulsion type sausages. The Weiss et al. patent describes the production of a Genoa-type salami. In the examples cited by the Examiner, all the ingredients are combined and mixed thoroughly. Column 5, lines 28-29. In the production of salami, it is necessary to avoid any extraction of proteins as this will result in smearing when the salami is stuffed in a casing. This problem is well-established in the industry and equipment has been specially developed to minimize this smearing. When smearing occurs, the fat and meat are no longer clearly separated and the marbling, which is a desirable characteristic of salami products, disappears or is faded and not sharp. Such products are considered to be defective. Smeared products are difficult to dry because the fat coats the meat particles, making transport of water therethrough difficult or impossible. Moreover, unless these products are otherwise preserved, the water which is contained therein causes them to rot at ambient temperatures.

Accordingly, any process according to the Weiss et al. patent would be performed to minimize solubilization of proteins, for instance, by working with frozen meats and mixing the ingredients in a bowl or chopper. The product produced according to the Weiss et al. patent must necessarily avoid exudation of proteins and any covering of the pieces of meat with a layer of exuded proteins--which is the opposite of the present invention. This is true for all the products described in the Weiss et al. patent with the exception of emulsion sausages, i.e., frankfurters. These latter products are characterized by the fact that the meat proteins are maximally released and used to combine the water and fat in a heat stable emulsion. A frankfurter emulsion is entirely different from the pieces of raw meat of the present invention. Hence, the Weiss et al. patent actually teaches away from the present invention.

In addition, Weiss et al. aims to lower the pH to below 5.2, preferably below 5.0 (see column 1, lines 20-25). The acidifying agent, the quantity, and the release of the acid are selected accordingly. In contrast, the present invention aims to lower the pH between the

pieces of meat to a point at which coagulation sets in. The rest of the meat is thus minimally affected. Hence, the type of agent, the release, the dispersal, and the concentration are chosen such that a rapid homogenous acidification of a layer of exuded proteins is obtained which leads to a partial coagulation of the exuded proteins without substantially lowering the overall pH of the product. These product conditions can be determined by routine experimentation. When a meat product produced according to the Weiss et al. patent is subjected to a lower pH below 5.0, the product sets or gels. Column 1, lines 15-18. This gelling process is well-known in meat processing and is different from coagulation. Gelling which occurs during lowering of the pH below the isoelectric point is distinct from acid coagulation; they are two different chemical reactions. Coagulation is a process which involves the formation of covalent bonds and is irreversible. Gelling does not involve the formation of covalent bonds and can be reversed. The hardening that the Weiss et al. patent seeks to obtain (column 1, lines 12-18) teaches away from the present invention. In addition, the Weiss et al. patent specifically refers to the production of emulsions, whereas the present invention is directed to the process of making larger pieces of raw meat from smaller pieces of raw meat.

Accordingly, claims 1, 3, 4, 12, 14, 15, and 18-20 are believed to define over the Weiss et al. patent.

In relying upon an excerpt from The Joy of Cooking for rejection of the claims thereover, the Examiner has asserted that the wine included in the recipe for making sausages inherently contains certain acids. The Joy of Cooking suggests working a little wine or water into seasoned chopped meat if during the stuffing of the casing, the sausage mix seems dry. This small quantity of wine will not lower the pH significantly enough to lower it below the isoelectric point and certainly not to a point at which coagulation occurs. It is well-established in the industry that wine added in the quantities that are considered by The Joy of Cooking does not lead to a significant lowering of the pH. An excess of quantity of

wine would be required to get even close to the isoelectric point. A very wet product would be required to produce a significant drop in pH resulting from the addition of wine. This would not allow for production of dry sausage as is the purpose of the recipe in The Joy of Cooking.

Even when the teachings of the Weiss et al. patent are combined with The Joy of Cooking, the present invention is not rendered obvious. The Weiss et al. patent states at column 1, lines 17-18 that "acidification must be delayed to ensure easy processing and avoid hardening of the emulsion." It should be clear that the wine added by the recipe of The Joy of Cooking does not release sufficient acid to start the process of hardening since the purpose of adding the wine is merely to facilitate processing (stuffing), i.e., to introduce some moisture.

The Joy of Cooking describes a process for making dry sausage. Salt is added to the meat, not by adding salt and then mixing it in, but by soaking the meat in brine. In so doing, one would not expect solubilized protein to cover the pieces of meat with a layer of exuded proteins as is required by the present invention. Accordingly, The Joy of Cooking does not anticipate the present invention.

In addition, The Joy of Cooking specifies the use of certain equipment "to cut and chop rather to grind and crush" and to use hardback fat and to work at low temperatures. All of this, including the use of brine, leads to a chopped mixture in which the fat and meat are separate entities. This is not a dough, but a chopped collection of meat. These are well-known practices in the art. The aim is to avoid the fat enrobing the meat particles and preventing the sausage from drying properly. As stated previously, if the sausage is not properly dried it will rot. Extraction of proteins with salt during processing makes the meat sticky and produces a dough of fat covering the meat. Such fat covered meat creates smearing which must be avoided in the production of sausage.

Applicant does not assert that the use of brine to salt meat will lead to rotting necessarily. The extraction of protein that should be avoided in the production of dry sausage interferes with the drying and results in rotting. Hence, the excerpt from The Joy of Cooking teaches away from the method of claims 1, 3, 4, 12, 15, and 18-20.

In rejecting the claims for obviousness over the combined teachings of the Weiner patent in view of the Bauer et al. abstract, the Examiner has asserted that the Weiner patent teaches a method of forming a beef loaf where chunks of meat are mixed with relatively finely ground beef as a binding agent along with salt and heated to 80-100°F, followed by rapid chilling. The Examiner has recognized that the Weiner patent does not teach that the binding agent could be an acid but instead relies upon the Bauer et al. abstract for asserted teachings to include a nontoxic organic acid as a sausage emulsion additive. Applicant traverses this rejection for the following reasons.

The Weiner patent differs from the process of the present invention by (1) including a heating step and (2) failure to solubilize proteins on the pieces of the meat. The Weiner patent discloses a process including a heating step where the meats are stuffed into a casing and the internal temperature thereof is heated on the order of 100°F. The ingredients of the beef loaf of the Weiner patent are placed in a stuffer and the voids within the stuffer are filled with a finely comminuted binder. The binder is made by grinding meat twice: once through a 1/4" plate and subsequently through a 3/32" plate. Meat reduced in this manner is formed in very small pieces yet the muscle structure is retained. There is no teaching or suggestion in the Weiner patent to treat the meat pieces to solubilize proteins on the surfaces of the meat.

As set forth on the record, the process disclosed in the Bauer et al. abstract relates to the production of frankfurter-type sausages. The translation of the Bauer et al. application which accompanied the Amendment filed December 17, 1998 shows that the text

of claim 1 of "Sorbinsaure und/or Kaliumsorbar" means potassium salt of sorbic acid can indiscriminately be substituted for sorbic acid. The salt itself does not have pH lowering properties; the sorbic acid cannot have been added with the intention of lowering pH in a controlled manner. As stated previously on the record, sorbic acid has such low solubility in water that it cannot be used for the intended purpose of the present invention. In addition, the Bauer et al. application discloses making emulsion sausage with a sorbic acid and "gegebenenfalls", a nontoxic acid and/or sodium salt thereof. Gegebenenfalls means "if required" or "if desired", hence the use of a nontoxic acid other than sorbic acid is not a requirement and may be left out. The fact that the Bauer et al. application states that the use of acids and/or sodium salt is optional indicates that the technological significance of this acid is not to lower pH since salts cannot do so. Claim 2 of the Bauer et al. application lists the acids as "bzw. ein Natriumsalz davon" including citric acid, tartaric acid, lactic acid, acetic acid, or sodium salts thereof. Thus, the acid and its salt are interchangeable. Since the acid and its salt are interchangeable, the acid is clearly not used to achieve a drop in pH. The cutter additive ("kutterhilfstoffe") is clearly not added to lower the pH. Hence, there is no teaching in the Bauer et al. abstract or the translation of the complete Bauer et al. document to supplement the deficiency of the Weiner patent. Accordingly, the pending claims define over the combined teachings of the Weiner patent and the Bauer et al. abstract.

In view of the amendment to claim 1 and for all the reasons detailed above, claims 1, 3, 4, 9-12, and 14-20 are believed to define over the prior art of record and be in condition for allowance. Entry of this Amendment and withdrawal of the rejections are respectfully requested.

Respectfully submitted,

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